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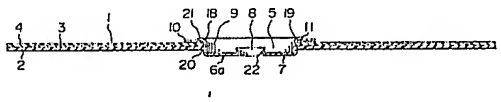
(54) Information recording media.

(57) An information recording medium (1) comprising a disc substrate (2) having at least laminated thereon a recording layer (3) and a central hole (5), and a magnetic clamping hub (6a) fitted into said central hole (5), said magnetic clamping hub (6a) having a spindle hole (8) at the center of a base portion (7) thereof, a cylindrical first upstand portion (9) rising from the outer periphery of the base portion (7), an upper flange portion (10) extending from the outer periphery of the upper end of the first upstand portion (9) and attached to an inner peripheral surface of the disc substrate (2) at the junction of the upstand portion (9) and the upper flange portion (10).

FIG.1



EP 0 325 399 A2

Description

INFORMATION RECORDING MEDIA

FIELD OF THE INVENTION

This invention relates to information recording media which are used as optical discs and the like, particularly information recording media which are set by a magnetic clamping system.

BACKGROUND OF THE INVENTION

There have heretofore been known information recording media for storing and reading information by converging ray of light such as laser beam on a recording layer thereof, wherein a magnetic clamping hub is fitted into a center hole of a plastic single disc substrate having the recording layer on one side of or inside said disc substrate so that said information recording media are clamped by the magnetic clamping system on a disc drive.

Fig. 3 of the accompanying drawings is a cross-sectional view showing the state of a conventional information recording medium clamped by the magnetic clamping system, and Fig. 4 is a partially enlarged view thereof. In the figures, reference numeral 1 designates an information recording medium, wherein a recording layer 3 is formed on one side of a disc substrate 2, the top surface of said recording layer is covered with a protective layer 4, and a magnetic clamping hub 6 of the dish-like shape is fitted into a center hole 5 of said disc substrate. The magnetic clamping hub 6 is formed by pressing a magnetic metal plate into a dish-like form, and the thus dished hub has a spindle hole 8 at the centre of said hub. A cylindrical upstand portion 9 of the hub 6 is inserted into the center hole 5 of the disc substrate 2, and the upper flange portion 10 of the hub 6 is fixed by means of an adhesive 11 to the inner peripheral surface of the protective layer 4 covering the recording layer 3 and the disc substrate 2.

The above-mentioned information recording medium 1 is contained in a cartridge 12, and the cartridge 12 is placed on a disc drive 13. The disc drive 13 is so designed that the magnetic clamping hub 6 of the information recording medium 1 is inserted into a clamping area 15 formed in a turn table 14, the inserted hub 6 is clamped by means of a magnet 16, and a spindle 17 projecting at the center portion of the turn table 14 is inserted into the spindle hole 8 of the magnetic clamping hub 6, whereby the information recording medium 1 is positioned. When the turn table 14 rotates in this state, the information recording medium 1 rotates, and the recording layer 3 is irradiated through windows (not shown) provided at the lower side of the cartridge 12 with laser beam or the like, thereby storing or reading information.

In such conventional information recording medium as illustrated above, however, because the magnetic clamping hub 6 is stamping pressed into a simple dish-like shape, there is observed such an inconvenience that the bending radius of a corner portion 18 formed between an upstand portion 9 and the upper flange portion 10 is liable to vary irregularly. In cases where the upstand portion 9 having an outer diameter practically equal to an inner diameter of the center hole 5 aligned with said center hole 5, if the bending radius of the corner portion 18 is large, the corner portion 18 interfers with an edge portion of the information recording medium 1 and a gap between the upper flange portion 10 and the protective layer 4 becomes excessively large, and there is a fear that the upper flange portion 10 and the protective layer 4 are not favorably bonded to each other. In order to inhibit such interference of the corner portion 18 with the edge portion of 19, the space between the upstand portion 9 and the disc substrate 2 must be made large, however, if it is done so, there was such a problem that no coaxial relationship between the disc substrate 2 and the magnetic clamping hub 6 can be maintained.

OBJECT OF THE INVENTION

This invention is intended to solve the above-mentioned problems, and it is an object of the invention to provide information recording media in which a disc substrate and a magnetic clamping hub can be attached satisfactorily to each other while maintaining a coaxial relationship between said disc substrate and said magnetic clamping hub.

SUMMARY OF THE INVENTION

The Information recording medium of the present invention, by which the above-mentioned object of the invention is attained, comprises a disc substrate having at least laminated thereon a recording layer and having at the center thereof a center hole, and a magnetic clamping hub fitted into the center hole of this disc substrate, said magnetic clamping hub having a spindle hole at the center of the base thereof, a cylindrical first upstand portion rising from an outer periphery of the base, an upper flange portion of said first upstand portion extending from an outer periphery of a top end portion of this first upstand portion and being attached to an inner peripheral surface of the disc substrate, and a concave portion formed at a corner portion of the first upstand portion and upper flange portion.

According to an another aspect of the invention, the information recording medium comprising a medium substrate having laminated thereon a recording layer and having at the center thereof a center hole, and a magnetic clamping hub fitted into the center hole of the disc substrate, said magnetic clamping hub having a spindle hole at the center of a base surface thereof, a cylindrical first upstand

portion rising from an outer peripheral of the base in the direction almost at right angles to the base, an upper flange portion of the first upstand portion extending form an outer periphery of a top end of this upstand portion in the direction almost at right angles to the upstand portion and being bonded to an inner peripheral surface of the disc substrate or a protective layer coated on the disc substrates, and a concave portion formed at a corner portion of the first upstand portion and the upper flange portion.

In the information recording medium of the said present invention, it is desirable that the magnetic clamping hub has a second upstand portion around the spindle hole into which a spindle of a disc drive is inserted.

In the present invention, the information recording medium is intended to include all media which record information on a recording layer thereof, such as optical discs, flexible optical discs and the like. Further, the magnetic clamping hub used in the present invention includes all the hubs formed from magnetic metals, plastics blended with magnetic materials, and the like magnetic materials.

In this information recording medium of the present invention, because a concave portion is formed at a corner portion of the upper flange and upstand portions of the magnetic clamping hub, no interference of the edge portion of the disc substrate with the corner portion occurs. On that account, even when the corner portion of the magnetic clamping hub irregularly varies, the disc substrate and the magnetic clamping hub can be maintained at a coaxial state by making a small gap between the disc substrate and the magnetic clamping hub and, at the same time, the adhesion between the information recording medium and the magnetic claimping hub is improved by filling the concave portion with an adhesive.

When the magnetic clamping hub having formed a guide wall around the spindle hole thereof is used, the disc substrate can be maintained at a state perpendicular to the spindle of the disc drive, because surface deflection of the disc substrate is inhibited at the time when the disc substrate is mounted on the disc drive or the information recording medium rotates on the turn table.

EMBODIMENT OF THE INVENTION

The present invention is illustrated below with reference to an embodiment shown in the accompanying drawings.

Fig. 1 is a cross-sectional view of an embodiment of the present invention,

Fig. 2 is a cross-sectional view of a magnetic clamping hub,

Fig. 3 is a cross-sectional view showing the state of a conventional information recording medium clamped by a magnetic clamping system,

Fig. 4 is a partially enlarged view of the conventional information recording medium.

In the figures, the same reference numeral designates the same or corresponding portion, and reference numeral 1 designates an information recording medium, reference numeral 2 designates a disc substrate, reference numeral 3 designates a recording layer, reference numeral 4 designates a protective layer, reference numeral 5 designates a center hole, reference numerals 6 and 6a designate a magnetic clamping hub, reference numeral 7 designates a base portion, reference numeral 8 designates a spindle hole, reference numeral 9 designates an first upstand portion, reference numeral 10 designates an upper flange portion, reference numeral 11 designates an adhesive, reference numeral 12 designates a cartridge, reference numeral 13 designates a disc drive, reference numeral 18 designates a corner portion, reference numeral 19 designates an edge portion, reference numeral 21 designates a concave portion, and reference numeral 22 designates a second upstand portion.

As shown in Fig. 1, the information recording medium 1 of the present embodiment comprises a transparent plastic disc substrate 2 having on one side thereof a recording layer 3, the surface of said recording layer 3 being covered with a protective layer 4. There may be reflective layer (not shown) between the recording layer 3 and the protective layer 4. Such information recording medium 1 has at the center thereof a center hole 5 into which a magnetic clamping hub 6a is fitted.

The magnetic clamping hub 6a is formed by pressing a circular magnetic metal plate into a dish-like shape, and has a cylindrical first upstand portion 9 and an upper flange portion 10, wherein a concave portion 21 is formed at the side of a corner portion 18 formed between the cylindrical first upstand portion 9 and the upper flange portion 10. At the periphery of a spindle hole 8 of the magnetic clamping hub 6a, a cylindrical second upstand portion rises from a base portion 7 of said hub 6a and is engaged with a spindle 17.

The first upstand portion 9 is raised from an outer periphery of the base portion 7 in the direction almost at right angles to the base portion 7, and the upper flange portion 19 extends from an outer periphery of the upper end of the first upstand portion 9 in the direction almost at right angles to the upstand portion. The upper flange portion 10 is bonded with an adhesive 11 to the inner peripheral surface of the protective layer 4 coated on the disc substrate 2. When no protective layer is coated on the surface of the disc substrate 2, the upper flange portion 10 is bonded directly to the inner peripheral surface of the disc substrate 2.

Further, the upper flange portion 10 may be attached to the protective layer 4 or the disc substrate 2 without adhesive 11, for example by means of calking.

At the corner portion 18 of the first upstand portion 9 and the upper frange portion 10, the concave portion 21 is formed so that it caves preferably in above the bottom surface of the upper flange portion 10.

The information recording medium 1 thus composed in the manner as mentioned above is used in the same way as in the convention ones. In this

information recording medium 1, however, because the concave portion 21 is formed at the corner portion 18 of the magnetic clamping hub 6a, irregularity in bending radius caused by the formation of the corner portion 18 is absorved by the concave portion 21 and no interference of the edge portion 19 of the disc substrate 2 with the corner portion 18 occurs. On that account, the disc substrate 2 can firmly attached to the upstand portion 9 even when a gap therebetween is made small. Thus, the center of the disc substrate 2 agrees with that of the magnetic clamping hub 6a, retaining a highly assured coaxial state between said disc substrate and said clamping hub. Furthermore, since the concave portion 21 is filled with the adhesive 11, a high adhesive strength is attained.

When the spindle 17 is inserted into the spindle hole 8, said spindle engages with the second upstand portion 22 and hence surface deflection is inhibited when the information recording medium 1 is placed on the disc drive 13 or when the disc substrate rotates on the turn table, maintaining a high flatness.

Having described the present invention with reference to a stamping pressed product of a magnetic metal as the magnetic clamping hub used in this embodiment, the magnetic clamping hub used in the invention may include injection-molded products of other molded products of plastics blended with magnetic materials.

Claims

1. An information recording medium comprising a disc substrate having at least laminated thereon a recording layer and having at a central hole, and a magnetic clamping hub fitted into said central hole, said magnetic clamping hub having a spindle hole at the center of a base portion thereof, a cylindrical first upstand portion rising from the outer periphery of the base portion, an upper flange portion extending from the outer periphery of the upper end of the first upstand portion and attached to an inner peripheral surface of the disc substrate, and a concave portion at the junction of the first upstand portion and the upper flange portion.

2. A medium according to claim 1 wherein said first upstand portion rises in a direction almost at right angles to the base portion and the said upper flange portion extends in a direction almost at right angles to the upstand portion and is bonded to an inner peripheral surface of the recording layer or a protective layer coated on the recording layer.

3. A medium according to claim 1 or 2 wherein said concave portion is above the bottom surface of the upper flange portion.

4. A medium according to claim 1, 2 or 3 wherein the magnetic clamping hub has a second upstand portion rising from the inner periphery of the base portion.

5. A medium according to any one of the preceding claims wherein the disc substrate is an optical disc substrate.

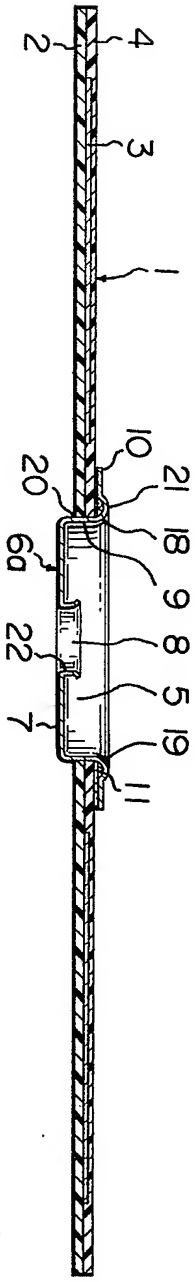


FIG.1

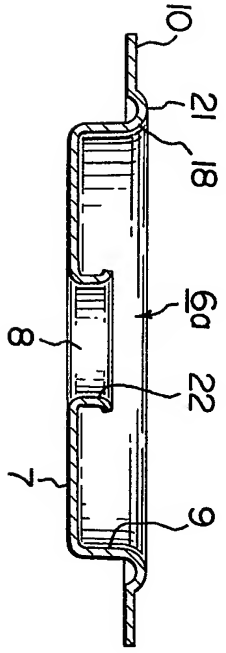


FIG.2

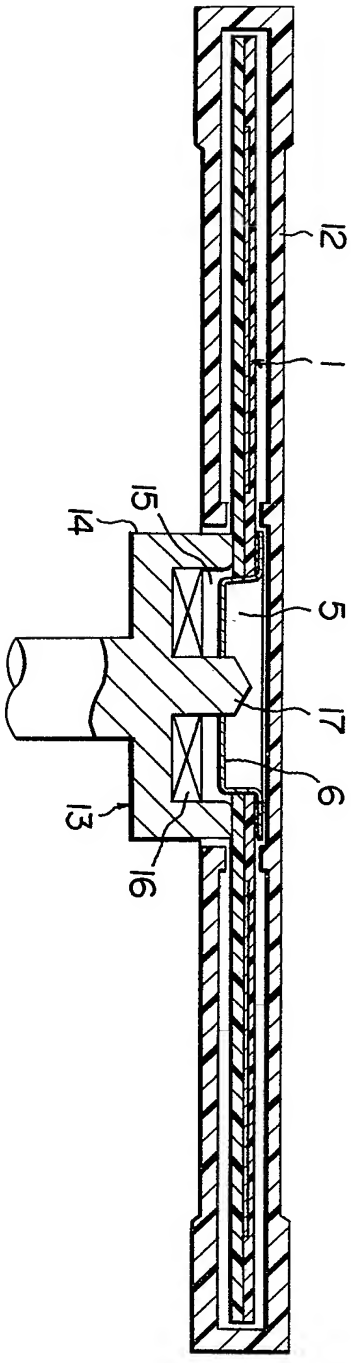


FIG.3

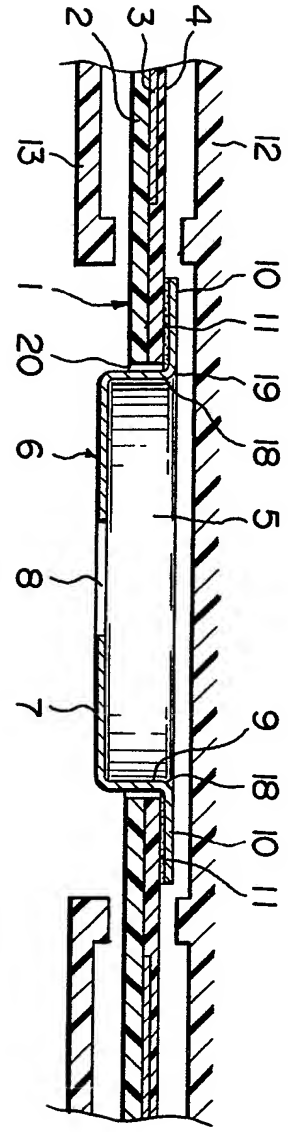


FIG.4